A North Carolina Small Watershed Proves Advanced Wastewater Treatment Results in Significantly Reduced Nutrient Loads

Presented by: Joe Pearce PE

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Triangle WWTP History

- Early 1960's – two facultative lagoons
- 1973 – 3 MGD Extended Aeration
- 1983 – 6 MGD Extended Aeration
- 1997 – Plant at 80% capacity
  - predicted high growth area.
  - HB 515 – Clean Water Responsibility and Environmentally Sound Policy Act
  - Design Started.
- 2005 – 12 MGD Enhanced Biological Nutrient Removal WWTP construction completed

Triangle Wastewater Treatment Plant

2005 TWWTP Facility

- Fine Screens and bagging system
- Grit Removal
- Three 4 MGD trains of a 5 Stage Biological Nutrient Removal process (Kruger process design)
  - Anaerobic Selector (3 zones-RAS degassing(1) and phosphorus release (2))
  - Primary Anoxic Reactor (Dual Zone Denitrification)
  - Oxic Zone (Oxidation Ditch with Dissolved Oxygen Control)
  - Secondary Anoxic Reactor with Carbon Source Addition (Dual Zone Denitrification)
  - Oxic Zone (Diffused Air)
- Chemical Phosphorus Trimming (Sodium Aluminate)
- Traveling Bridge Sand Filters (5 filters)
- UV Disinfection
- SCADA control system

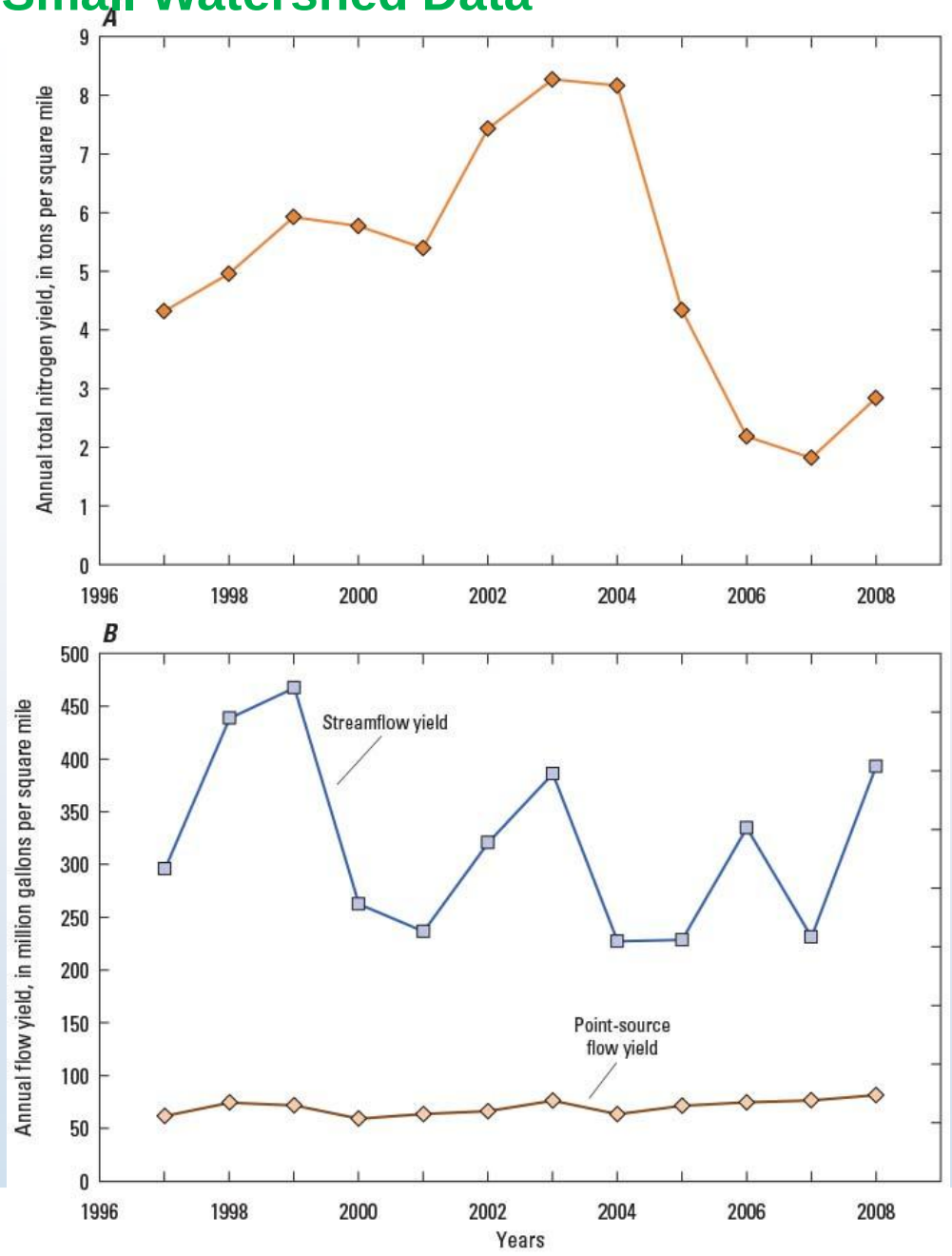
2013 Triangle WWTP Nutrient Discharge

Nutrient	Jordan Lake Allocation NPDES Limit (#/year)	Effluent Mass Load (#/year)	Average Effluent Concentration (mg/l)
Nitrogen	111,207	62,619	3.15
Phosphorus	8,432	3,272	0.165

* Average Flow: 6.52 MGD

TWWTP Small Watershed Data

- NE Creek Genlee: Upgrade to Triangle WWTP had beneficial effect on total N
- PS flows: 15-33%
- 1997-2004: avg yield 6.3 ton/mi^2
- 2006-2008: avg yield 2.3 ton/mi^2
- 64% reduction in total N yield following upgrade



USGS Report: Relation of Watershed Setting and Stream Nutrient Yields at Selected Sites in Central and Eastern North Carolina, 1997-2008

Lead author: Stephen Harden, USGS (slharden@usgs.gov)

Report available at http://pubs.usgs.gov/sir/2013/5007/

Financials

- Total Cost of Improvements approximately $47,000,000.

- Funded through sewer revenues only.

- Sewer rates are at or below rates of neighboring utilities.

Triangle WWTP Future

– In 2012, a ReUse water system (rated up to 5.2 MGD) was installed which can provide cooling tower water and irrigation water to RTP industrial users and further reduce effluent nutrient load. Distribution system will be installed over the next decade.

– Sewer Treatment Capacity is available for RTP new development plan.